Radar Types

By Cherub Log & “Skip” Distance

Of the many Radar types developed by the UK, USA and Australia, 23 were considered for use in R.A.N. vessels. With three exceptions, all were ascribed a 3 digit identification number, eg 277. One exception was the early UK developed 79. The other two were the US “Sugar George” SG, and “Sugar Charlie” SC. A prefix of “A” meant Australian designed and built. Suffixes of “M”, “P” & “Q” meant 1st, 2nd and 3rd modification respectively. Suffixes of “X”, “Y” & “Z” meant 1st, 2nd and 3rd experimental set respectively. Suffix “U” meant modification for fitting to small craft eg MTBs.

During her commissioned life, a ship might have had installed as many as 8 or 9 different and modified Radar types, yet carry only 3, 4 or 5 at any one time.

Admiralty classifications and examples of Radar types were as follows:

WS Warning of surface ships. 271 272 273
WSR Warning of surface ships and accurate ranges. 271M 272M 273M
WA Warning of aircraft. 79
WAR Warning of aircraft and accurate ranges. 279 280 281
WC Warning of surface ships and aircraft close. 286 291
WCR As WC, also accurate ranges. 290
GS Gunnery surface low angle. 274 284
GA Gunnery aircraft high angle. 275 285
GC Gunnery close range. 282 283 289

The symbol § indicates that the data were not available when this article went to print. Some of the performance figures are close approximations

ID Number: 79. Manufactured in: UK. In service August 1938. Primary Function: Long range air warning. Operating Frequency: 42.827 MHz, 7 M, VHF band. Antenna: §. Output: 70 Kw. PRF: 50 Hz. Pulse: 10µseconds. Beam: §, Range: 60 NM. Display: §. Power Supplies: §. Ships: §

ID Number: 262. Manufactured in: UK. March 1945. Primary Function: Gunnery close range. Anti aircraft. Operating Frequency: 10,000 MHz, 3 cm, S band. Type of Antenna: Rotating disc, 1 ½ degrees off centre, conical scanning waveguide fed, fitted to STAAG and CRBFD mounts. Output: 30 Kw. PRF: 150. Pulse: 0.5 µsecond. Beam: horiz 5.2º, vert5.2º. Range: §. Display: § Ships: Quadrant, Sydney (Cruiser)

ID Number: 271. Manufactured in: UK. In service: May 1941. Primary Function: Surface warning
Operating Frequency: 3,000 MHz, 10 cm, S band. Type of Antenna: Dual flat cheese half eliptical. Magnetron antenna mounted. 370 degree rotation only. Housed in a plastic lantern. Output: 90 Kw. PRF: **§**. Pulse: **§.** Beam: horiz 5º, vert 20º. Range: 25 NM. Display: Initially A scan, prior to PPI development. Power supplies: §. Ships: Adelaide. Canberra. Napier.

Type of Display: Initally “A” scan (prior to PPI development)

ID Number: A272. Manufactured in: Australia by AWA. In service January 1941. Primary Function: Surface warning of submarines and small craft. Operating Frequency: 3,000 MHz, 10 cm, S band. Antenna: Dipole in parabolic reflector. 370º rotation hand driven by “M” type transmission. Galvanised iron waveguide. Housed in timber lantern. First Australian magnetron fitted set.Output: 10 Kw. PRF: 50. Pulse: §. Beam: §. Range: 25 NM. Display: “A” scope in Radar office. Power supplies: 230volt 50 cycles. Ships: Bathurst class minesweepers (corvettes).

ID Number: 273. Manufactured in: UK. In service: January 1941. Primary Function: surface warning
Operating Frequency: 3,000 MHz, 10 cm, S band. Type of Antenna: Double cheese. Receiver above, transmitter below. Gyro stabilised. Magnetron mounted on the antenna. Output: 70 Kw. PRF: §. Pulse: §. Beam: §. Range: 25 NM. Display: “A” Scope. Power Supplies: §. Ships: Shropshire.

ID Number: 275. Manufactured in: UK. In service: January 1945. Primary function: Gunnery control high and low angle. Operating frequency: 3,000 MHz, 10 cm, S band. Type of Antenna: Two nacelles, transmitter starboard side, receiver port side. Output: 400 Kw. PRF: 600. Pulse: 0.5 µsecond. Beam: horiz 4.8º, vert 5.2º. Range: §. Display: §. Power supplies: 180 volts 500 cycles. (Was part of the flyplane Predictor System). Ships: Tobruk

ID Number: A276. Manufactured in: Australia. In service: January 1944. Primary Function: Surface warning. Operating Frequency: 3,000 MHz, 10 cm, S band. Type of Antenna: Parabolic small single dish, continuous rotation, stabilised in azimuth.. 10 RPM in either direction. 80 degree sector sweep. Output: 500 Kw. PRF: 500. Pulse: §. Beam: horiz 3.5º, vert §. Range: 16 NM. Display: PPI. Power supplies: 180 volts 500 cycles. Ships: Bathurst Class Minesweepers (Corvettes). Yandra.

ID Number: 277P. Manufactured in: UK. In service: September 1943. Primary function: Surface and air warning. Operating Frequency: 3,000 MHz, 10 cm, S band. Type of antenna: AUK was approx 1.35 metres in diameter circular dish being waveguide fed rotating at 18 rpm. The Antenna could be elevated for aircraft slant height ranging. Power output: 400 Kw. PRF 500. 1.9 µsecond pulse. Beam horiz 4.5º, vert 4.5º Range 35 NM. Display: HPI design B. Power supplies: 180 volts 500 cycles.. Ships: Sydney A/C, Quadrant. Shropshire.

ID Number: 277Q. Manufactured in: UK. In service: January 1944. Primary function: Surface and air warning. Operating frequency: 3000 MHz, 10 cm, S band. Type of antenna: ANU parabolic reflector rotating at 18rpm. The antenna could be elevated for aircraft slant height ranging. Power output 500 Kw. PRF 500. 1.9 µsecond pulse. Beam horiz 4.5º, vert 2.5º. Display:HPI design B. Power supplies:180 V 500 cycle. Ships: Sydney, Quadrant.

ID Number: 281. Manufactured in: UK. In service: December 1940. Primary function: Air search. Operating frequency: 90 Mcs, 3,3 metres, VHF. Antenna:

Separate dipoles for receiving and transmitting. Transmitting antenna mounted on mainmast and fed by twin wires with spreaders of plastic at approx 70 cm intervals. Receiving antenna mounted on foremast and fed by pyrotenax Coaxial fed. 5 rpm. Output: 600 Kw. PRF: § Pulse: §. Beam: horiz 40º, vert §. Range: Up to 100 NM. Display: “A” scope. Power supplies: §. Ships: Shropshire.

ID Number: 282. Manufactured in: UK. In service: §. Primary function: Gunnery control. Operating frequency: 180 Mcs, 1.67 metres, VHF band. Antenna: Yagi attached to the Director and controlled by the Director. Output: 15Kw, output valve was micropup. PRF: §. Pulse: §. Beam: §. Range: §. Display: §. Power supplies: 180 volts 50 cycles. Ships: Shropshire.

ID Number 283: Manufactured in UK. In service September 1942. Primary function AA Fire Control. Operating frequency: 180 Mcs, 1.67 metres. VHF band. Antenna §. Output: 15 Kw. PRF: §. Pulse: §. Beam: §. Range: §. Display: §. Power supplies: § Ships: Shropshire

ID Number: 284: Manufactured in: UK. In service: December 1940. Primary function: AA Fire Control. Operating frequency: 599,584 Mcs, 0.5 cm L band. Antenna: § on top of director. Output: 25 Kw. PRF: § .Pulse: §. Beam: §. Range: 10 NM. Display: §. Power supplies: §. Ships: Shropshire

ID Number: 285: Manufactured in UK. Inservive January 1941. Primary function: AA Fire Control. Operating frequency: 180 Mcs, 1.67 metres. VHF band. Antenna §. Output: 15 Kw. PRF: §. Pulse: 15 µsecs. Beam: horiz 20º. Range: §. Display: §. Power supplies: §. Ships: Shropshire

ID Number: A286P. Manufactured in: Australia. In service: January 1941. Primary function: Surface and air warning. Night warning of surface craft up to 6 nautical miles. Would detect aircraft up to 86 NM depending upon aircraft altitude. Operating Frequency: 176 MHz, 1.7 metres, VHF band. Antenna: 286M fixed Yagi later replaced by 286P rotating bedstead array having horizontal dipoles. Rotation caused by hand operated bowden cable for 370º rotation, later replaced by “M” type system. Output: 100 Kw via coax to antenna. PRF: 1000. Pulse: 2 µseconds. Beam: §. Range: §. Display: “A” scope in Radar office. Power supplies: 80 volts 1000 cycles. Ships: Australia. Perth. Arunta. Warramunga. Napier. Nestor. Nizam. Norman. Quadrant. Queenborough. Vendetta All Australian built Bathurst Class Minesweepers (Corvettes). Warrego

ID Number: A290. Manufactured in: Australia. In service: 1941. Primary Function: Air search. Operating Frequency: 200 MHz, 1.5 metres, VHF band. Antenna: Yagi with 4 directors and 3 reflectors. Output: 100 Kw. PRF: §. Pulse: 0.5 µsecond. Beam: §. Range: §. Display: §. Power supplies: §. Ships: Adelaide. Canberra. Kanimbla. Manoora. Westralia. Napal. Quality. Quiberon. Quickmatch. Stuart. Vampire. Vendetta. Voyager.

ID Number: 293. Manufactured in: UK. In service: January 1944. Primary Function: Combined air and surface warning. Operating Frequency: 3,000 MHz, 10 cm, S band. Antenna: Copper waveguide horn fed parabolic reflector,

controlledby “M” transmission. Output: 500 Kw. PRF: 500. Pulse: 0.4 µseconds. Beam: horiz 2.5º, vert §. Range: §. Display: §. Power supplies: 180 volts 500 cycles. Ships: Tobruk. Quadrant. Sydney (AC).

ID number: 960. Manufactured in: UK. In service: 1946. Primary function: Surface & air warning. Frequency: 88.175Mcs, 3.4 metres, VHF band. Antenna: Horizontal dipoles in grid array coaxial fed, continuous rotation 15 rpm. Output: 400 Kw. PRF: 250. Beam: horiz 35º, vert §. Range: §. Display: §. Power supplies: (see below). Ships: Sydney AC. (See further notes below)

ID Number: 974. Manufactured in: UK. In service: §. Primary Function: Navigation - high definition surface warning. Operating Frequency: 10,000 MHz, 3 cm, X band. Antenna: Dual cheese parabolic waveguide fed continuous rotation. Output: §. PRF: §. Pulse §. Beam: §. Range: §. Display: §. Power supplies: §. Ships: Quadrant.

ID number: 984. Manufactured in: UK. In service: §. Primary Function: Combined air and surface warning. Operating Frequency: 10,000 MHz, 3 cm, X band. Antenna: Dual cheese waveguide fed. Output: §. PRF: §. Pulse: §. Beam: §. Range: §. Display: §. Power supplies: §. Ships: Sydney AC. Shropshire.

ID Number: SC4, Sugar Charlie. Manufactured in: USA. In service: July 1943. Primary Function: Air warning. Operating Frequency: 9338 Mcs, 3.2 cm, X band. Antenna: §. Output: 7 Kw. PRF: 1000. Pulse: §. Beam: horiz 1.6º, vert 23º. Range: 25 NM. Display: §. Power supplies: §. Ships: Arunta. Warramunga. Bataan.

ID Number: SG. Sugar George. Manufactured in: USA. In service: February 1942. Primary Function: Surface warning. Operating Frequency: 3,000 MHz, 10 cm, S band. Antenna: Semi elliptical parabolic single antenna waveguide fed. Motorised rotation. Stabilised in azimuth 24 rpm. Output: §. PRF: §. Pulse: 2µseconds. Beam: horiz §, vert §. Range: §. Display: PPI. Ships: Hobart. Shropshire. Arunta. Warramunga. Bataan.

ID Number 960: (Notes provided by Ch. RE Gordon Wood). This long range warning set had better performance than 281. The display and control system was easy to operate. 960 had a range of 200 NM. It was fitted in cruisers and was associated with 277 & 293 for an integrated air warning system. Power supplies were common for these 3 sets and associated IFF. There was a master trigger for all transmissions. There were 3 versions of 960 each with a different antenna syatem. 960 with AQQ antenna had separate arrays for spot frequencies of 86, 88 and 90 Mcs. 960M had antenna system ANA, which was a light weight antenna and operated between 80 and 90 Mcs. 960P had antenna system ANB operating at 80 to 90 Mcs. It was installed on aircraft carriers and had a large screen for data presentation. Frequency variation in the various models of 960 was achieved via a manually operated selsyn.

The main power came from a special alternator comprising one 250 and two 500 cps machines synchropnised mechanically simply by being driven on one shaft. The 250 cps machine povided power to the 960 modulator. One of the 500

cps machines provided power to the other txs associated with 960, and the second 500 cps machine provided power to the receivers and displays. Power delivery of the alternator ranged between 6 and 18 KVA.

The modulator gave 5 & 15 µsecond pulses at a PRF of 250. Peak power output was between 400 and 450 Kw. The 960 took 30 minutes to warm up, and 1 ½ minutes to switch on. Cathode followers allowed up to 8 PPIs and 3 sector displays to be connected.

Ranging Units RTB & RTE. While not Radar sets , these units were used in conjunction with the PPI and TPI displays to provide accurate ranging for both long and close range armaments. The 3 ranges were 0 to 10,000 yards, 0 to 36,000 yards and 0 to 100,000 yards.

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